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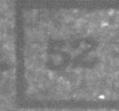
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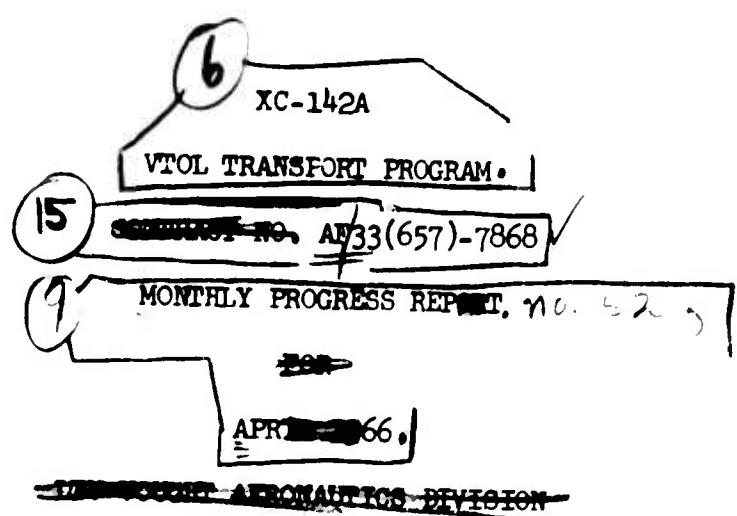
MOLECULAR PROBE REPORT

VOLUME 10, NO. 52



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W. V. Hease  
Vice President - Program Director  
V/STOL Programs

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INTRODUCTION

This report has been prepared in accordance with the requirements of Item 7 of the Contract Number AF33(657)-7868 and is the fifty-second in a series of monthly reports covering activity on the XC-142A VTOL Transport Aircraft Program.

This report is devoted specifically to a summary of progress for the month of April 1966.

SUMMARY

At the end of April, the overall XC-142A program was on schedule, with the No. 1 aircraft expected to be delivered in May and the No. 2 aircraft to be returned to flight status in July.

Evaluation of the new configuration propellers (2P) was accomplished on the No. 1 aircraft during the month with good results. In addition to prop stress measurements in the hover and conventional flight modes, the aircraft accomplished a number of taxi tests over simulated bumps on the runway. The remainder of the reporting period was devoted to readying the aircraft for delivery in May.

The No. 2 aircraft progressed satisfactorily through portions of repair work, leading to delivery by August, 1966. The No. 5 aircraft underwent clean configuration shakedown early in the month in preparation for delivery. On 7 April, General B. A. Schriever, Commander, Air Force Systems Command, flew as co-pilot in the aircraft, becoming the 25th pilot to have flown the XC-142A. On 22 April, the No. 5 aircraft was delivered to the Air Force and ferried to Edwards Air Force Base, with a stop at Albuquerque, N. M., on the way.

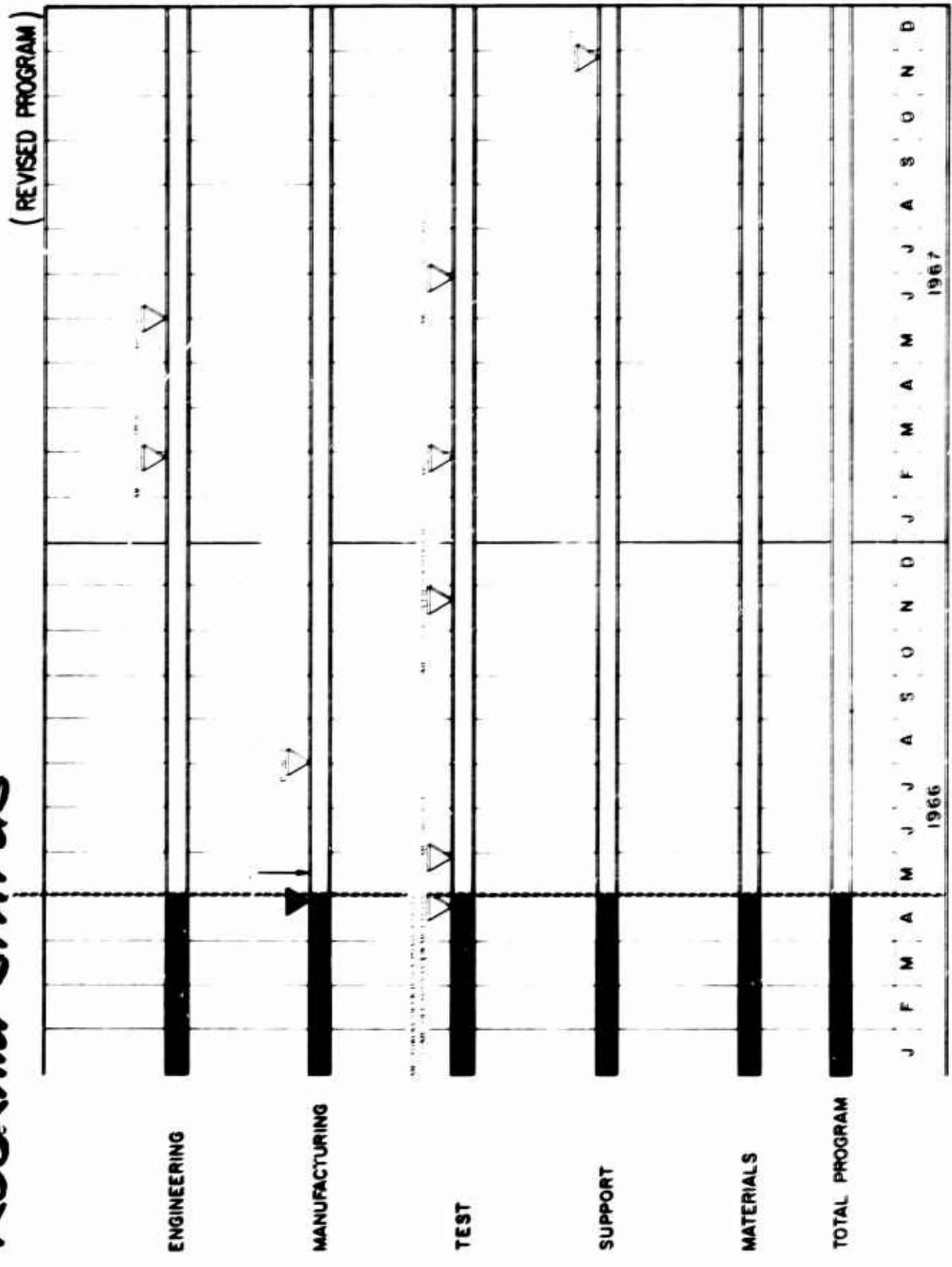
At Edwards Air Force Base, the No. 3 aircraft remained in a dormant status, pending a repair decision. The No. 4 aircraft returned to flight status at the beginning of the month after a layup period devoted to transmission system inspection and incorporation of instrumentation for the air drop program scheduled to begin at NAF El Centro. The aircraft was bailed to the Contractor and ferried to El Centro on 21 April for the initiation of the Category I air drop program. Late in the month, flights were conducted at El Centro, primarily for extraction chute tow tests to determine extraction loads at various speeds.



Presentation of Certificate to General Schriever After Flight in  
XC-142A April 7, 1966

At the end of the month, the Category I flight total was 214 flights and 151 hours and 40 minutes of flight time while the Category II flights numbered 54 for 63 hours and 12 minutes of flight time. Overall status of the five aircraft amounted to 268 flights for 214 hours and 52 minutes. A total of 26 pilots had flown the XC-142A aircraft by the end of the month.

# V/S<sup>2</sup>TOL - XC-142A PROGRAM STATUS



ITEM 1A DEVELOPMENT OF XC-142A AND FABRICATION OF FIVE PROTOTYPE MODELS

Repair work of the No. 2 aircraft progressed essentially on schedule during the month toward the objective of delivery to EAFB by August, 1966.

ITEM 1B FABRICATION OF STATIC TEST ARTICLE (Completed)

ITEM 2 FABRICATION OF MOCKUP (Completed)

ITEM 3 GROUND TEST PROGRAM

3.1 STRUCTURAL TESTS (Completed)

3.2 TRANSMISSION SYSTEM TESTS (Completed)

3.3 SYSTEM TESTS - All XC-142A system and component tests are complete with the exception of the wing incidence actuator component qualification tests by Jarry Hydraulics and the heat and ventilating and rain removal systems tests by ITW. Tests of the wing incidence actuator are expected to be complete in May. Tests of the heat and ventilating system and the rain removal systems require flight testing to confirm satisfactory operation and are planned to be conducted utilizing No. 1 airplane following bailment to the Contractor.

ITEM 4 ENGINEERING DATA

4.1 ACCOMPLISHMENTS

During April, the Engineering effort continued to be devoted to support of the flight test program including preparation of airplanes No. 1 and 5 for delivery. Support continued to be devoted to repair of airplane No. 2 which was damaged during the landing incident of 19 October 1965. Repairs are being performed in accordance with CCN 39. Changes found necessary as a result of Category I and II testing continued to be released for incorporation in all airplanes. All changes were processed through BMR Dallas, ASD, and WRAMA for approvals and assignment of TCTO numbers. Essentially all changes were of minor nature.

Special attention was devoted to investigating the failure of the wing shaft flexible coupling on the No. 1 airplane following a flight on 6 April. The point of failure was at the hub weld joint of the inboard most set of flexible discs. Cause of the failure was a weld miss at this joint. As a result of the failure all flexible couplings are being subjected to fatigue cycling at Bendix to insure sound welds prior to release for flight. Airplanes 1, 4, and 5 have couplings which have been subjected to the full acceptance test criteria.

#### ITEM 5 DESIGN DATA

##### 5.1 STATUS OF DESIGN DATA

Status of design data at the close of the reporting period was as follows:

	Design Data	Surveillance	Total
Total Submissions to Date	215	246	461
Total Submissions to Go	4	6	10
Grand Total	219	252	471
Percent Complete	95%	95%	95%

##### 5.2 SCN STATUS

As of 30 April, a total of 254 specification change notices against contract reports had been submitted. Of these 232 were approved, 18 were disapproved, and 4 were pending.

#### ITEM 6 FLIGHT TEST

##### 6.1 ACCOMPLISHMENTS

During the month of April, sixteen flights were accumulated on the three Category I flying XC-142A aircraft as shown:

Four flights were conducted utilizing the No. 1 aircraft

Flight No.	Date	Time
79	4-2	1:21
80	4-6	:12
81	4-6	:17
82	4-26	:26

The total flight time of two hours and 16 minutes for these flights brings the cumulative total for No. 1 airplane to 58 hours and 28 minutes. The flights were devoted to evaluation of flying qualities and performance of the aircraft with 2FF propellers and the accumulation of stress data of the propellers. The discrete bump taxi test phase of the off-runway suitability program was also initiated. During flight 81, the flex coupling between the tri-directional gearcase and the No. 3 IGC failed as the result of a weld miss. Because of this failure, an investigation of all the flex couplings and ball splines in the transmission system was conducted. This investigation resulted in the return of several flex couplings and ball splines to the vendor for the performance of a fatigue loading spectrum (See paragraph 4.1). Flight operations were suspended until all suspect couplings were replaced.

Seven Flights were conducted utilizing the No. 4 aircraft

Flight No.	Date	Time
46	4-1	0:12
47	4-5	0:48
48	4-20	0:46
49	4-21	0:48
50	4-25	1:24
51	4-26	1:36
52	4-27	0:42



Delivery of XC-142A No. 5 to the Air Force April 22, 1966

The total flight time accumulated during these flights was 6 hours and 16 minutes. The No. 4 airplane was bailed to the Contractor on 4 April and was ferried to NAF El Centro, California for the air drop program 21 April. In the interim the 25 hour inspection and the installation of the air drop instrumentation package was completed. The air drop program was initiated with flight 50 on 25 April.

Seven flights were conducted utilizing the No. 5 airplane:

Flight No.	Date	Time
6	4-2	1:14
7	4-6	:05
8	4-7	:18
9	4-16	:58
10	4-16	1:29
11	4-22	2:12
12	4-22	2:18

The total flight time of 8 hours and 34 minutes for these flights bring the cumulative total for No. 5 airplane to 10 hours and 37 minutes. These flights were devoted to pre-delivery shakedown which included acoustical tests with acoustical treatment in the cargo compartment and also the calibration of the wing strain gauges which are a part of the off-runway suitability instrumentation. The airplane was delivered to the Air Force and ferried to EAFB, California on 22 April, with a refueling stop at Albuquerque. Total flight time for the ferry mission was 4 hours and 30 minutes.

The following significant tests were accomplished during the month of April:

- . First hover with 2FF props

- Hover at 95% and 100% prop RPM
- Hover 1/2 and all roll SAS off, all other SAS on
- Hover 1/2 and all yaw SAS off, all other SAS on
- Verticircuits at 95% and 100% prop RPM
- Lateral translations to 25 knots
- Performance data with 2TF props at 5,000, 10,000, 15,000 and 20,000
- Sized parachutes and determined extraction line length for cargo extraction at 125, 85, 75 and 65 knots at 5,000 feet
- Obtained acoustical data in cargo compartment with acoustical treatment installed, throughout STOL and clean flight envelope
- Familiarization flight by General B. A. Schriever in the No. 5 airplane
- Initiated discrete bump taxi test phase of off-runway suitability program. Performed six taxi operations for a total of 26 runs.

ITEM 7 REPORTS

The Technical Progress Report for the month of March, 1966 was submitted on 28 April and the Financial Report for the month of March, was submitted on 22 April.

ITEM 8 SPARE PARTS FOR FIVE PROTOTYPE AIRPLANES

Spare parts status at the end of the reporting period was as follows:

1098 Total line items scheduled for shipment to bonded warehouse  
(increase of 36 since last report)

208 Total line items scheduled for direct shipment to vendor  
for overhaul

1306 Total line items on order to date

ITEM 9 DEVELOPMENT AND FABRICATION OF AGE

The status of AGE development and fabrication at the end of April

was as follows:

	<u>Through April</u>	<u>Submitted</u>	<u>Approved</u>	<u>Demonstrated</u>
CFE-AGERD		171	120	112
GFE-AGERD		<u>64</u>	<u>59</u>	<u>32</u>
		235	179	144

ITEM 10 SPARE PARTS FOR AGE - No activity in April

ITEM 11 TRAINING AND TRAINING EQUIPMENT (Completed)

ITEM 12 CONTRACTOR SUPPORT OF FLIGHT TEST PROGRAM

The Category II flight test program at EAFB continued to be supported by the Contractor with approximately 32 people assigned to the off-site office. The No. 3 aircraft fuselage remained in dormat status at EAFB during the reporting period.

The No. 4 aircraft was bailed to the Contractor on 4 April for incorporation of instrumentation and the conduction of the Category I air drop program at the Naval Aerospace Facility, El Centro, California. The No. 5 aircraft was ferried from Dallas to EAFB via Albuquerque on 22 April to participate in Category II operational suitability testing.

Total flight activity in the Category II flight test program at the end of the reporting period included 54 flights for 63 hours and 12 minutes of accredited flight time.

VISITS TO CONTRACTOR FACILITY DURING APRIL

<u>Date</u>	<u>From</u>	<u>Purpose</u>
7	WSEG, Wash., D. C.	Review Program Status
13-18	ASD, SPO EAFB	Pilots' Handbooks Conference
11-19	EAFB	Flight Test Conference
13	USA Waterways Express Station	Off-runway Test Discussion
18	Cdr., Carrier Div. Four	Program Briefing
18-22	EAFB	Ferry No. 5 Aircraft
25-28	EAFB	Flights in No. 1 Aircraft
29	Asst. DCO, TAC	Program Briefing
30	Industrial College of Armed Forces	Program Briefing

ECP INDEX

<u>ECP No.</u>	<u>Title</u>	<u>Status</u>
1	Fuselage, Installation of Aft Fuselage Escape Doors	Disapproved
2	Electrical, Installation of 35 KVA Generators	Disapproved
3	Electronics, Additional AT-256A/ARC UHF Communications Antenna; Installation of	Disapproved
4	Flight Tests, Category I Inflight Load Survey; Elimination of	Authorized
5	Ground Tests, Escape System Sled Tests; Elimination of	Authorized
6	Fuel System, Ferry Fuel Tank; Elimination of	Authorized
7	Escape System, Douglas Escapac 1-C Ejection Seat in Lieu of LW-1 (Modified) Seat; Installation of	Cancelled
8	Furnishings; Cargo, Troop Accessories for Four Airplanes, Elimination of	Authorized
9	Ground Test, Wing Fatigue Test; Elimination of	Authorized
10	Structural Demonstrator Instrumentation, Addition of	Authorized
11	Ground Test, Structural Failing Load Test, Elimination of	Authorized
12	Navigation Equipment, AN/ARC-21C in Lieu of AN/ARM-52 (V); Provisions for	Disapproved
13	Propulsion System, Integral Gearbox Propeller System Test; Reduction of	*
14	Drawing Quality Requirements; Reduction of	*
15	Weight Control Policy; Revision of	Disapproved
16	Main Propeller IGC Bearing Change	Authorized

<u>ECP No.</u>	<u>Title</u>	<u>Status</u>
17	Aluminum Forging Treatment to Improve Corrosion Resistance	Cancelled
18	Redesign Main Propeller Blade; Full Scale Test at NASA-Ames	Authorized
18-1	Redesign Main Propeller Blade; 0.60 Scale Test at NASA-Ames	Authorized
19	Elimination of Engine Nacelle Anti-Icing	Cancelled
20	Deletion of Category I Flight Tests on No. 4 Aircraft	Authorized
21	Cargo Compartment Trim; Elimination of	Disapproved
22	Revision to Engine Throttle Control Mechanism	Authorized
23	Extension of Category I Flight Test Program	Disapproved
24	Retrofit of Power Takeoff Engine Units	Authorized

\* No longer identified as ECP.

CCN INDEX

<u>CCN No.</u>	<u>Title</u>	<u>Date</u>
1	Substitute 35 KVA Generator for 25 KVA Generator	12-19-62
2	Reduction in Data Requirements and Engine Designation Change	4-26-63
3	Substitute 25 KVA Generator for 35 KVA Generator	2-04-63
4	Reduction in IGB Propeller Testing	5-03-63
5	Approval of ECPs 4-9	6-05-63
6	Elimination of Structural Failing Load Tests	7-23-63
7	Approval of ECPs 5, 6, 8, 9, 16	7-23-63
8	Additional Electronic Support Equipment	7-19-63
9	Cancellation of CCNs 5 and 7 and Approval of ECPs 5, 6, 8, 9, 16	8-02-63
10	Partial Cancellation of CCN No. 2 and Rein-statement of Reduction in Data Requirements	8-22-63
11	Partial Cancellation of CCN No. 2 and Rein-statement of Engine Designation Change	8-22-63
12	Approval of ECP 18-1	9-30-63
13	Approval of ECPs 4 and 10	11-13-63
14	Approval of ECP 18	11-19-63
15	Approval of Revision to Contract Data Requirements Document	12-05-63
16	Approval of ECP 20	2-19-64
17	Approval of Inspection of Damaged Engine	3-16-64
18	Incorporation of Revision A to Detail Spec into Item 1 of Basic Contract	6-04-64

CCN INDEX

<u>CCN No.</u>	<u>Title</u>	<u>Date</u>
19	Approval of ECP-24	6-15-64
20	Dynamic Analysis of VTOL Thrust Stand	11-9 -64
21	Maintenance of Flight Control Simulator	12-4 -64
22	Revision of Maintenance Manual for Addition of Repair Data	2-15-65
23	Flight and Maintenance Manuals Revision	4-05-65
24	In-Flight Load Measurement Program	5-10-65
25	Cool Suit Provisions	5-28-65
26	Category II Instrumentation Modifi- cation on Aircraft Numbers 1 and 3	6-22-65
27	Study for Reduction of STOL Landing Distance	6-15-65
28	Improved Braking System	6-15-65
29	Category II Instrumentation Modifi- cation on Aircraft Numbers 1 and 3	6-22-65
30	Conditional Acceptance of No. 4 Aircraft	7-07-65
31	Removal of Parts from Flight Control Simulator	7-26-65
32	Conditional Acceptance of No. 3 Aircraft	7-27-65
33	Addition of Hydraulic Quantity Indicators	1-31-66
34	Unprepared Surface Operations	1-31-66
35	Installation of Improved Brake System	1-31-66
36	Technical Manual Change	1-31-66
37	Cargo Loading and Aerial Delivery	1-31-66

CCN INDEX

<u>CCN No.</u>	<u>Title</u>	<u>Date</u>
38	Open Cargo Doors in Flight	1-31-66
39	Repair of No. 2 Aircraft	2-09-66
40	Unprepared Surface Operations (Cancels CCN 34)	3-07-66
41	Cargo Loading and Aerial Delivery Tests	3-11-66
42	Delivery Configuration of No. 5 Aircraft	4-15-66
43	Maintenance and Data Reduction Services on No. 1 Aircraft	4-25-66

LIST OF ABBREVIATIONS

A/C	Aircraft
AGE	Aerospace Ground Equipment
AGERD	Aerospace Ground Equipment Requirements
AMC	Army Material Command
APU	Auxiliary Power Unit
ASD	Aeronautical Systems Division
ATC	Air Training Command
CCN	Contract Change Notice
CFE	Contractor Furnished Equipment
CSD	Constant Speed Drive
DIET	Design Information Element Test
EAFB	Edwards Air Force Base
ECP	Engineering Change Proposal
GFE	Government Furnished Equipment
IGC	Integral Gear Case
PERT	Program Evaluation and Review Technique
PITS	Propulsion Integrated Test Stand
QEC	Quick Engine Change
SPO	Systems Program Office
TBP	Time Between Overhauls
UHT	Unit Horizontal Tail
WRAMA	Warner Robbins Air Material Area
TCTO	Time Compliance Technical Order